Double Patenting

Claims 1-37 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 6,418,158 issued to Vishwanath et al., hereinafter "Vishwanath".

The Applicants respectfully submit the present application claims subject matter that is patentably distinct from the subject matter claimed in the commonly owned Vishwanath patent. The Applicants submit the Vishwanath patent relates to the nature of the transmitted waveform, which was separated from Applicants' present disclosure at the time of concurrent filing. The Vishwanath patent claims a composite waveform signal, transmitted as a burst within a channel, used for synchronization. The component waveforms, composite bandwidth, and instantaneous frequencies of the waveform are each disclosed and claimed.

The Applicants' present disclosure claims a system and method which relates to the efficient detection of the waveform at a receiver. The detection disclosed and claimed presently by the Applicants includes "de-chirping" observed samples, followed by the use of a fast Fourier transform (FFT) to detect individual chirps. These observations are then combined for two chirps. The Applicants claim a method to receive a burst, such as the burst claimed in the Vishwanath patent, detecting the composite waveform, and estimating frequency and timing offsets such that synchronization can be achieved. A system, including a phase shifter and processor, is also claimed by the Applicants to achieve this.

The Vishwanath patent discloses and claims a composite waveform for use in synchronization, and Applicants' present disclosure claims include a system and method to achieve synchronization using a waveform, such as that disclosed in the Vishwanath patent.

As demonstrated above, Applicants' claims 1-37 are patentably distinct from the subject matter claimed in the commonly owned Vishwanath patent. The Examiner also cites U.S. Patent No. 6,097,336 in the double patenting rejection discussion, however this is believed to be a typographical error, and the reference actually is in regards to the Vishwanath

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patent. Since the Applicants' claims 1-37 are not obvious variations of the invention described in claims 1-17 of the Vishwanath patent, Applicants respectfully requests the double patenting rejection be withdrawn.

Claim Rejections Under 35 U.S.C. 102(b)

Claims 1-4 and 7 stand rejected under 35 U.S.C. 102(b) as being anticipated by WO 96/02990 issued to Nyström et al., hereinafter "Nyström". Applicants respectfully traverse the rejections for the reasons discussed below.

Regarding independent claim 1, Applicants respectfully submit Nyström addresses a distinctly separate problem in a different fashion. The Applicants' claim a method in which two chirps are simultaneously transmitted, with a detection method not disclosed in the Nyström patent. The method of pre-FFT synchronization disclosed in the Nyström patent would fail to detect simultaneously transmitted chirps. In the Nyström patent, a method is disclosed for pre-FFT synchronization, that is, synchronization of the received signal before conversion from the time domain to the frequency domain (see page 4, lines 29-35). The Nyström patent discloses the transmission of a chirp signal in an individual frame, such that the transmission of two chirps requires two different adjacent frames to avoid potential mutual interference. The detection of the chirp signal is achieved by a comparison of received signal and stored signal bit patterns (see page 6, lines 1-5). In doing so, the Nyström patent fails to disclose receiving a burst including two or more waveforms, such as an up-chirp and a down-chirp, as claimed by the Applicants in independent claim 1. Additionally, the method disclosed in the Nyström patent with would fail to detect the simultaneously transmitted chirps as claimed by the Applicants in dependent claims 2 and 3.

The Applicants' claim a method and system which recognizes that the two chirps are orthogonal and can be transmitted simultaneously to reduce sync overhead by 50%. Applicants' claim 1 includes a method to receive such a composite burst, and in claims 2-4,

detect each component waveform, and determine a frequency and timing offset in an acquisition section of a mobile terminal. Dual-chirp waveforms are well suited for detection at a mobile terminal by implementing a fast Fourier transform (FFT).

Applicants further submit the Nyström patent operates at a lower performance level as it quantitizes to 1-bit. The Nyström patent employs time-domain correlation which requires an extensive DSP resource. To reduce complexity, Nyström simplifies the algorithm by the decimation and 1-bit quantization. In doing so however, Nyström results in much poorer detection and estimation performance.

In contrast, the Applicants claim a novel frequency domain processing method and system with FFT. The algorithm claimed by the Applicants is not only much simpler, but achieves the optimal performance since no quantization and decimation are needed.

Regarding dependent claim 7, Applicants further submit the Nyström patent discloses an FFT, but utilize it for a distinctly separate purpose. Applicants submit the FFT is utilized for time-domain correlation in the Nyström patent, whereas the Applicants claim a system and method of using an FFT for synchronization. Specifically, the Nyström patent discloses an FFT process to demodulate the data signal from the transmitted signal (see page 1, lines 27-29). The Nyström patent proceeds to further disclose a system and method for synchronization prior to conversion from the time domain to the frequency domain (i.e. pre-FFT) (see page 4, lines 32-35). Synchronization achieved using the FFT is neither disclosed nor suggested by the Nyström patent.

As demonstrated above, since the Nyström patent does not disclose nor reasonably suggest every limitation of independent claim 1 or the respective dependent claims 2, 3, 4 and 7, these claims should be in condition for allowance. Accordingly, withdrawal of the rejection is respectfully requested.

In addition to the art cited above, the Examiner states U.S. Patent No. 6,304,619, hereinafter "Citta", discloses a receiver for use in receiving a signal having an up-chirp and a

down-chirp. Applicants respectfully submit that the system and method claimed in the Citta patent does not apply dechirping before the FFT, and requires using the FFT to obtain the time-domain signal, essentially using the FFT twice (see col. 7, lines 1-12). The Applicants claim a system and method of dechirping first, and then using the FFT for direct detection and estimation.

CONCLUSION

For all the above reasons, the Applicants respectfully submit that independent claims 1, 21 and 34 and their corresponding dependent claims should be allowable over the Vishwanath, Nyström and Citta patents. Accordingly, it is believed that the application is in condition for allowance and notice to this effect is respectfully requested.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. John T. Whelan, Esquire at telephone number (301) 428-7172, so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully Submitted,

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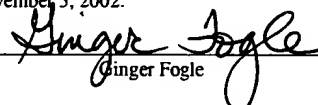P.O. Box 956
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